9. f', f'' exist no pts of infl. f'' does not change sign

$3 + -\frac{1}{2}(x-6)$

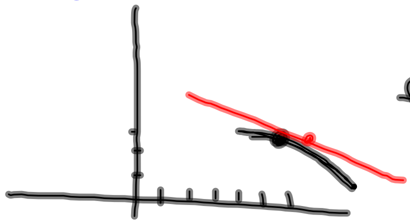
$3 + -\frac{1}{2}(7-6)$

$f(6) = 3$

$f'(6) = -\frac{1}{2}$ dec

$f''(6) = -2$

f'' always $-$



$f(7) < f(6) = 3$

$f(7) < 3$

$m = -\frac{1}{2}$

$L(7) = 2.5$

$3 + \left(-\frac{1}{2}\right) 1$

$f(7) < L(7)$

$f(7) < 2.5$

$y_0 + m(x - x_0)$

Δx

Apr 8-9:22 AM

10.

$\cosh(x) = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} \ldots$

$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} \ldots$

✓ $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \frac{x^6}{6!} \ldots$

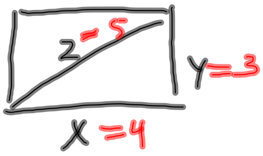
$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} \ldots$

✓ $e^{-x} = 1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \frac{x^5}{5!} \ldots$

$\frac{e^x + e^{-x}}{2} = \cosh(x)$

Apr 8-9:36 AM

11.



when $x=4$, $y=3$

$\frac{dx}{dt} = \frac{dz}{dt}$ $\quad \frac{dy}{dt} = k\frac{dz}{dt}$

find k

$x^2+y^2=z^2$

$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 2z\frac{dz}{dt}$

$2\cdot 4\frac{dz}{dt} + 2\cdot 3k\frac{dz}{dt} = 2\cdot 5\frac{dz}{dt}$

$\frac{dz}{dt}(8+6k) = 10\frac{dz}{dt}$

$6k = 2$

$k = \frac{1}{3}$

Apr 8-9:43 AM

4.

$f(x) = \lim_{h\to 0}\frac{\tan(x+h)-\tan(x)}{h} = \sec^2 x$

$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h} = f'(x)$

Apr 8-9:50 AM

Review 20 Methods of Integration

1. know basic formulas

2. u substitutions - makes a complicated integral look basic

guidelines u = inside function (composite)

is one part the der. of another?

du ↑ let u = ↑

only off by constant? no prob. we can fix

Apr 8-9:53 AM

3. Integration by parts $\int u\,dv = uv - \int v\,du$

u = lipet

use if $\int$ product

1 function = u

2^{nd} function dx = dv

also used for $\int \ln x\,dx$, $\int \tan^{-1} x\,dx$

4. partial fractions

$$\int \frac{2}{(x-1)(x+2)}\,dx = \int \frac{A}{x-1} + \frac{B}{x+2}\,dx$$

let x=1: $A = \frac{2}{3}$ let x=-2: $B = -\frac{2}{3}$

find A, B with cover up

$\frac{2}{3}\ln|x-1| - \frac{2}{3}\ln|x+2|$ +C

$\frac{2}{3}\ln\left|\frac{x-1}{x+2}\right| + C$

Apr 8-9:59 AM

$$\int 7\tan^5 x \sec^2 x\, dx \qquad \text{let } u=\tan x \quad du=\sec^2 x\, dx$$

$$\int 7u^5\, du = 7\frac{u^6}{6}+c = \frac{7}{6}\tan^6 x + c$$

$$\frac{1}{3}\int 3x^2 \sin x^3\, dx \qquad u=x^3 \quad du=3x^2\, dx$$

$$\frac{1}{3}\int \sin u\, du = -\frac{1}{3}\cos u + c$$

$$= -\frac{1}{3}\cos x^3 + c$$

Apr 8-10:07 AM

$$\int x^2 \ln x\, dx = \frac{x^3}{3}\ln x - \int \frac{x^3}{3}\cdot\frac{1}{x}\, dx$$

let $u=\ln x \quad dv=x^2\, dx$

$du=\frac{1}{x}dx \quad v=\frac{x^3}{3}$

$$= \frac{x^3}{3}\ln x - \frac{1}{3}\int x^2\, dx$$

$$= \frac{x^3}{3}\ln x - \frac{1}{3}\frac{x^3}{3} + c$$

Apr 8-10:14 AM